CLAIMS

What is Claimed is:

1. A method of preparing a pyrrole comprising the step of:

reacting a donor-acceptor cyclopropane with a nitrile in the presence of an effective Lewis acid catalyst.

2. The method of claim 1, wherein the Lewis acid is trimethylsilyl trifluoromethanesulfonate.

3. The method of claim 1, wherein at least one substituent group is selectively positioned in the cyclopropane.

4. The method of claim 3, wherein the position of the substituent in the resulting pyrrole is optionally at the the 4-positon, the 5-position or both the 4 and 5 positions.

5. The method of claim 1, wherein the stereochemistry of the cyclopropane has no effect on reaction efficiency.

6. The method of claim 1, wherein the pyrrole preparation is compatible with at least one protective group.

7. The method of claim 6, wherein the protective group is optionally a silylene, a benzyl ether or an acetate.

8. The method of claim 1, wherein the pyrrole is unsymmetrical.

9. The method of claim 1, wherein the cyclopropane has a C(2) substituent that is an electron withdrawing group.

10. The method of claim 1, wherein the reaction is used to generate combinatorial libraries.

11. A synthesis reaction comprising:

a donor-acceptor cyclopropane;

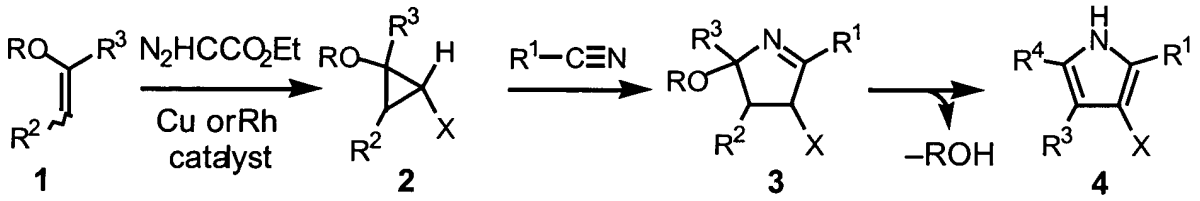
an aliphatic, aromatic, branched, α,β-unsaturated, aryl, or otherwise functionalized nitrile; and

a Lewis acid activator, wherein the synthesis reaction requires cycloaddition, dehydration and tautomerization.

12. The synthesis reaction of claim 12, wherein the cyclopropane has a substituent at C(2) that is an electron withdrawing group.

13. The synthesis reaction of claim 12, wherein the pyrrole if formed without the formation of multiple constitutional isomers.

14. A method for the synthesis of di-, tri- and tetrasubstituted pyrroles comprising the following steps:



wherein RO is a carboxylate groups; R^1, R^2, R^3 and R^4 are each independently aryl or alkyl groups or hydrogen; the nitrile is aliphatic, aromatic, branched, α,β-unsaturated, or otherwise functionalized; X is an ester or ketone; and Y is a Lewis acid.

15. The method of claim 14, wherein compound 4 is unsymmetrical pyrrole.

16. The method recited in claim 14, wherein compound 4 is a 3,4-dihydro-2H-pyrrole.